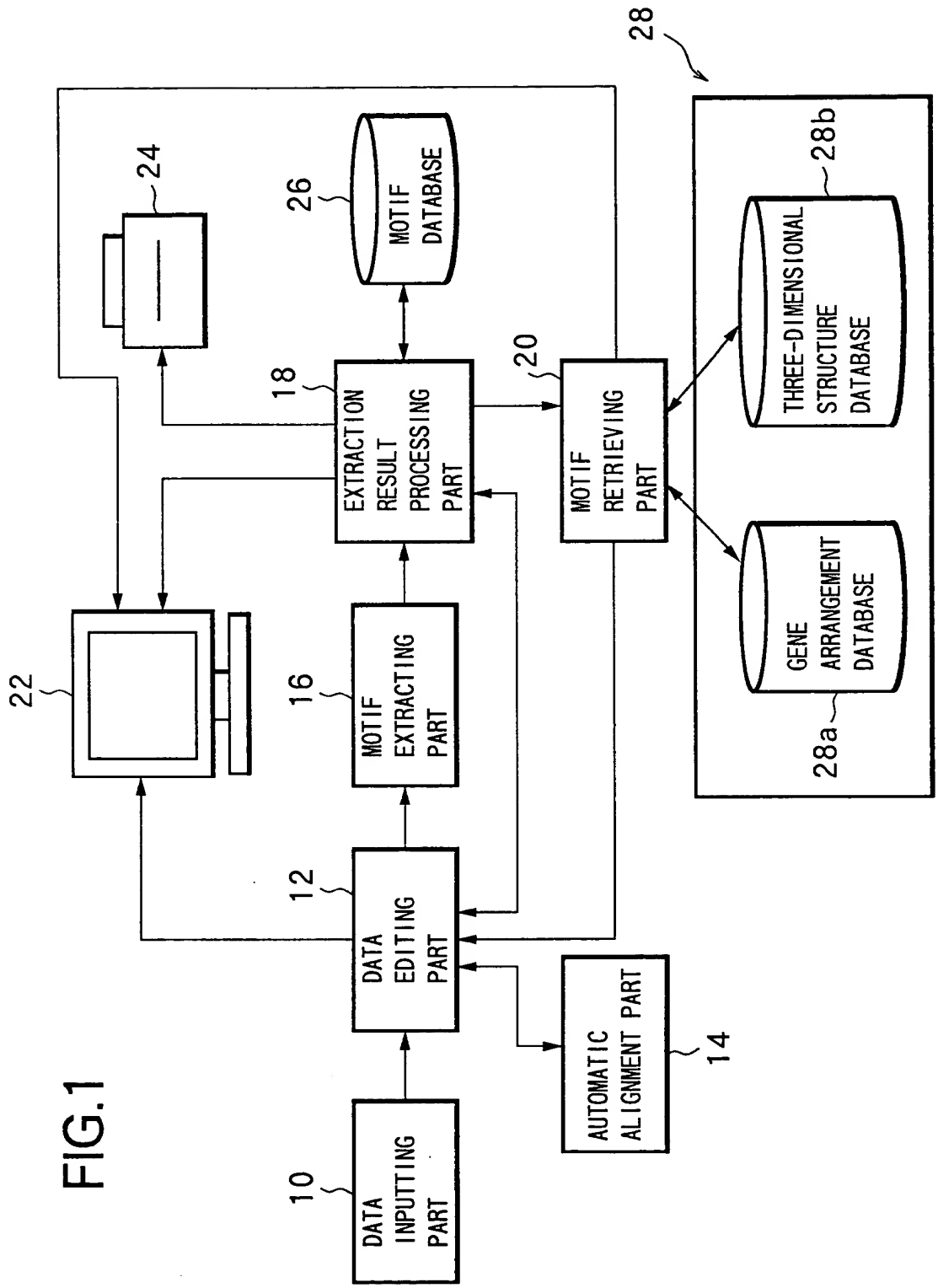

28
24
26
MOTIF DATABASE
18
EXTRACTION RESULT PROCESSING PART
20
MOTIF RETRIEVING PART
28b
THREE-DIMENSIONAL STRUCTURE DATABASE
GENE ARRANGEMENT DATABASE
28a
22
16
MOTIF EXTRACTING PART
12
DATA EDITING PART
AUTOMATIC ALIGNMENT PART
14
10
DATA INPUTTING PART

FIG.1

FIG.2

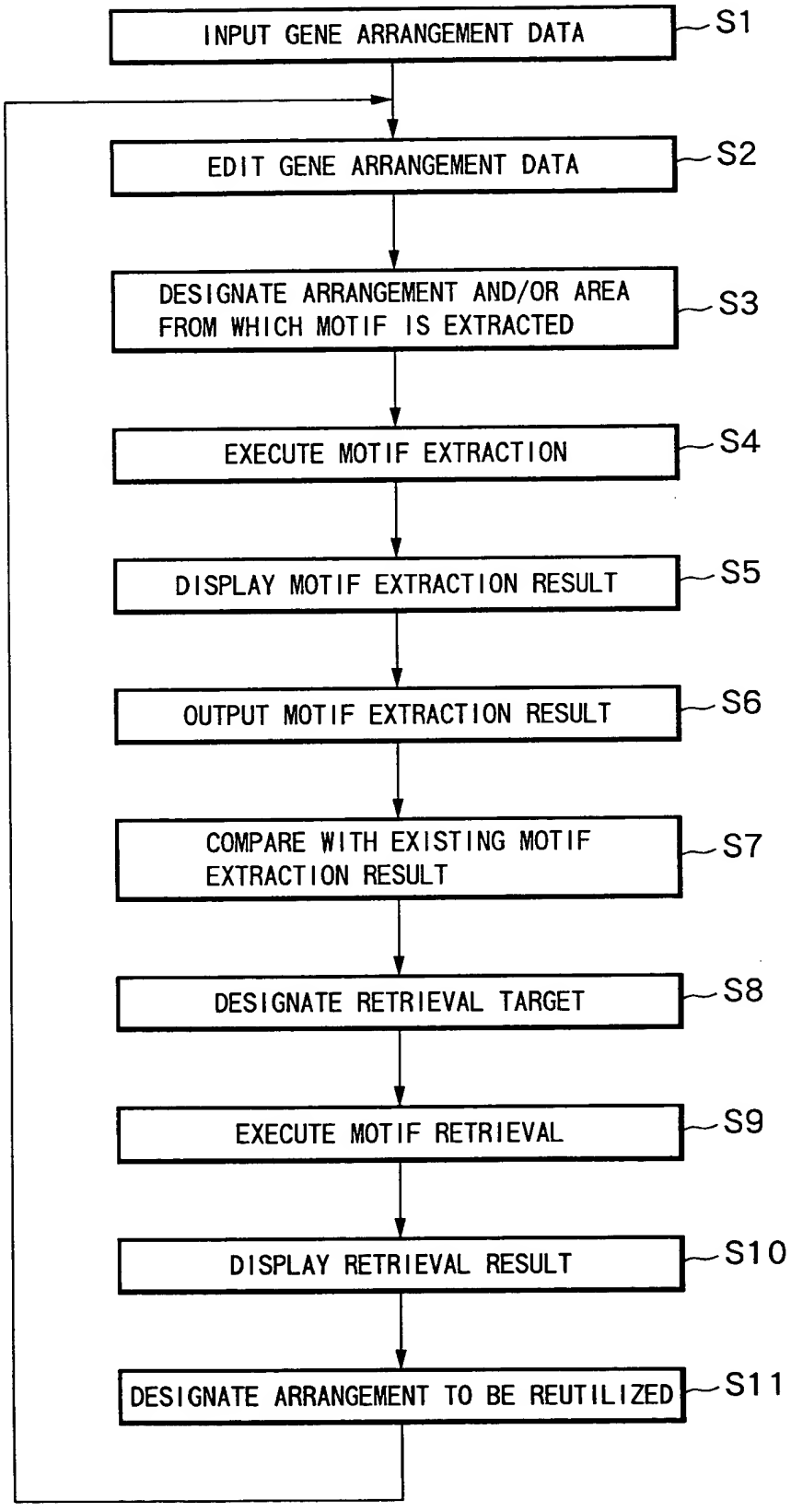

INPUT GENE ARRANGEMENT DATA
S1
EDIT GENE ARRANGEMENT DATA
S2
DESIGNATE ARRANGEMENT AND/OR AREA FROM WHICH MOTIF IS EXTRACTED
S3
EXECUTE MOTIF EXTRACTION
S4
DISPLAY MOTIF EXTRACTION RESULT
S5
OUTPUT MOTIF EXTRACTION RESULT
S6
COMPARE WITH EXISTING MOTIF EXTRACTION RESULT
S7
DESIGNATE RETRIEVAL TARGET
S8
EXECUTE MOTIF RETRIEVAL
S9
DISPLAY RETRIEVAL RESULT
S10
DESIGNATE ARRANGEMENT TO BE REUTILIZED
S11

FIG.3

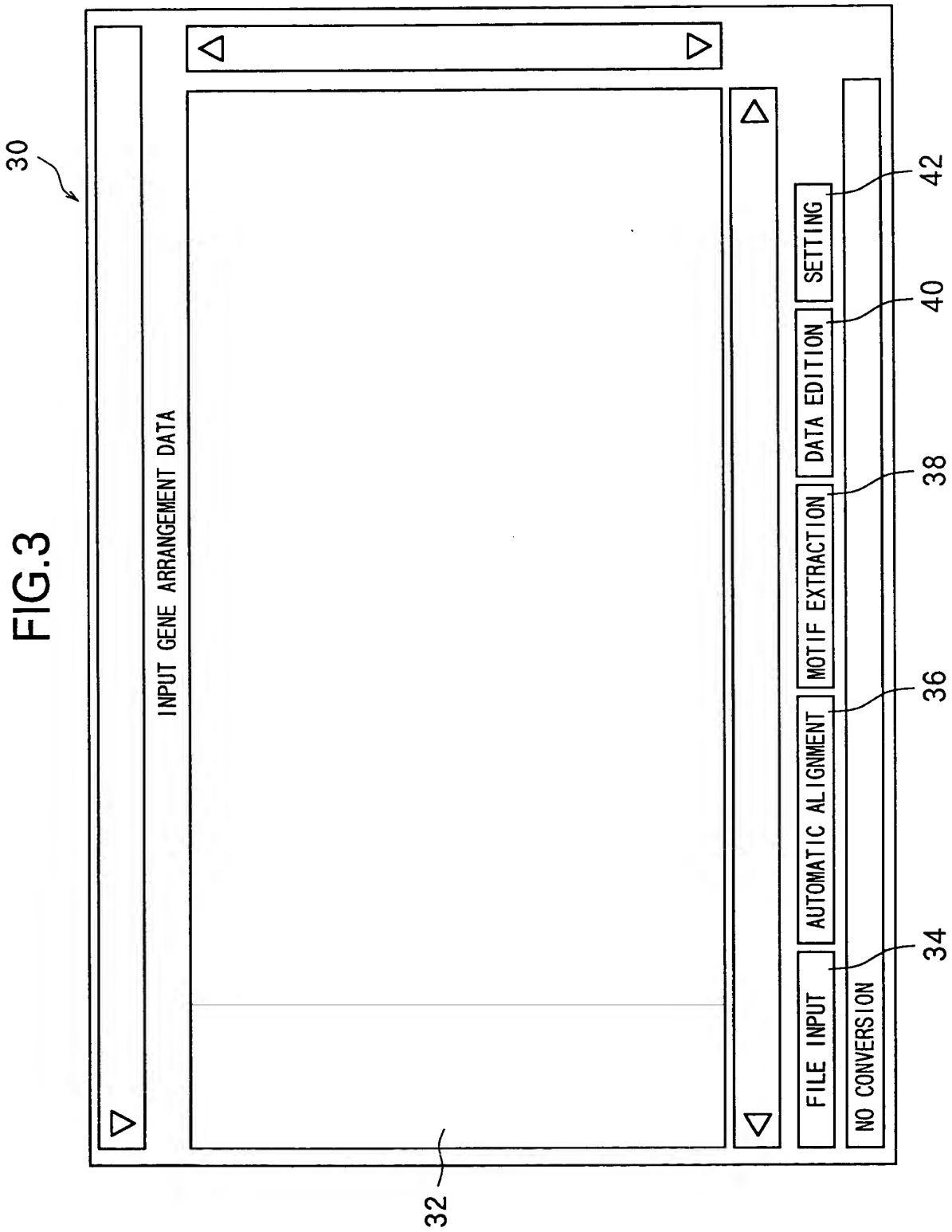

30
INPUT GENE ARRANGEMENT DATA
FILE INPUT
AUTOMATIC ALIGNMENT
MOTIF EXTRACTION
DATA EDITION
SETTING
NO CONVERSION
32
34
36
38
40
42

FIG.4

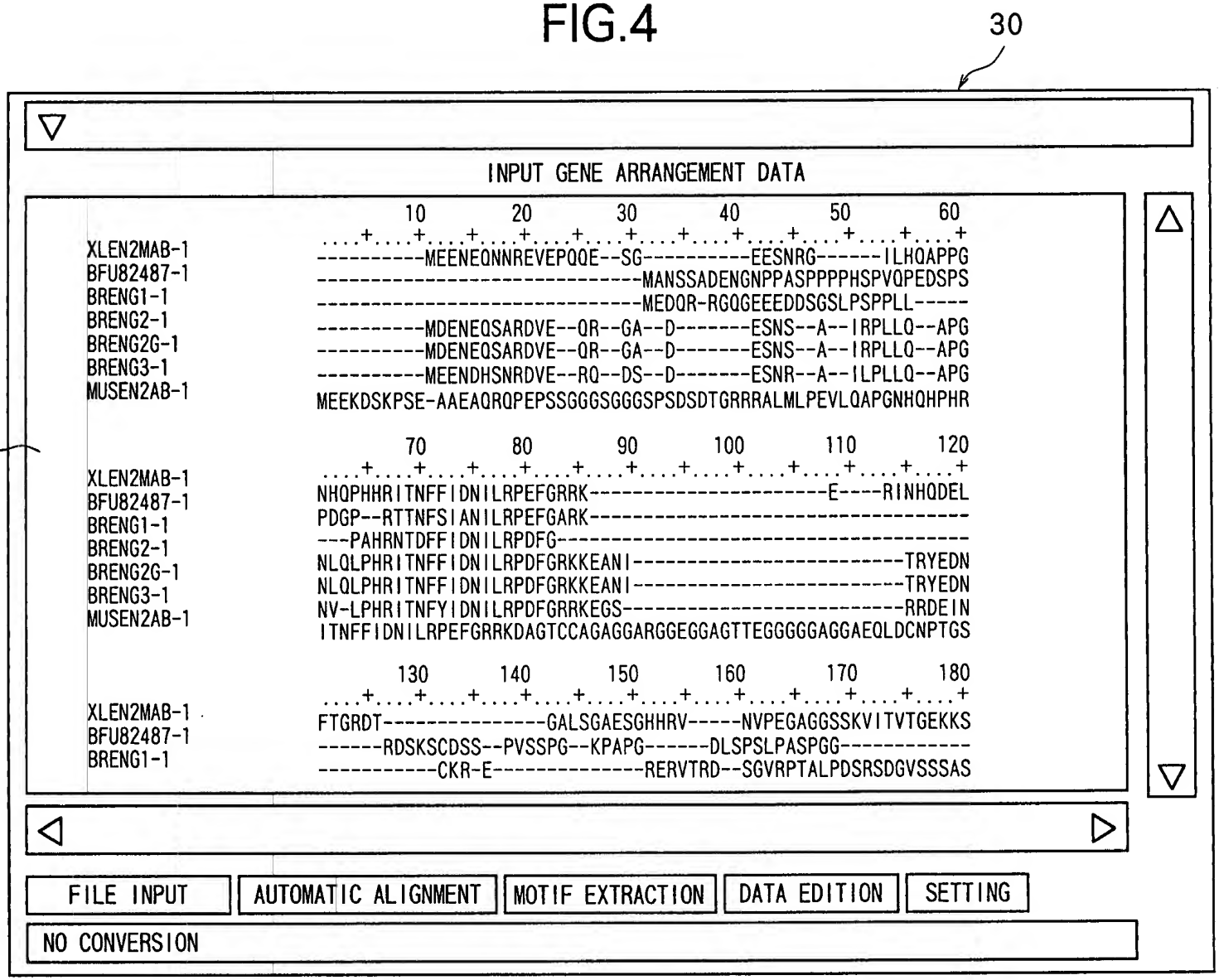

30
32
INPUT GENE ARRANGEMENT DATA
10 20 30 40 50 60
XLEN2MAB-1 ----------MEENEQNNREVEPQQE--SG----------EESNRG------ILHQAPPG
BFU82487-1 ------------------------------MANSSADENGNPPASPPPPHSPVQPEDSPS
BRENG1-1 ------------------------------MEDQR-RGQGEEEDDSGSLPSPPLL-----
BRENG2-1 ----------MDENEQSARDVE--QR--GA--D-------ESNS--A--IRPLLQ--APG
BRENG2G-1 ----------MDENEQSARDVE--QR--GA--D-------ESNS--A--IRPLLQ--APG
BRENG3-1 ----------MEENDHSNRDVE--RQ--DS--D-------ESNR--A--ILPLLQ--APG
MUSEN2AB-1 MEEKDSKPSE-AAEAQRQPEPSSGGGSGGGSPSDSDTGRRRALMLPEVLQAPGNHQHPHR
70 80 90 100 110 120
XLEN2MAB-1 NHQPHHRITNFFIDNILRPEFGRRK----------E----RINHQDEL
BFU82487-1 PDGP--RTTNFSIANILRPEFGARK----------
BRENG1-1 ---PAHRNTDFFIDNILRPDFG----------
BRENG2-1 NLQLPHRITNFFIDNILRPDFGRKKEANI----------TRYEDN
BRENG2G-1 NLQLPHRITNFFIDNILRPDFGRKKEANI----------TRYEDN
BRENG3-1 NV-LPHRITNFYIDNILRPDFGRRKEGS----------RRDEIN
MUSEN2AB-1 ITNFFIDNILRPEFGRRKDAGTCCAGAGGARGGEGGAGTTEGGGGGAGGAEQLDCNPTGS
130 140 150 160 170 180
XLEN2MAB-1 FTGRDT----------GALSGAESGHHRV-----NVPEGAGGSSKVITVTGEKKS
BFU82487-1 ------RDSKSCDSS--PVSSPG--KPAPG------DLSPSLPASPGG----------
BRENG1-1 ----------CKR-E----------RERVTRD--SGVRPTALPDSRSDGVSSSAS
FILE INPUT
AUTOMATIC ALIGNMENT
MOTIF EXTRACTION
DATA EDITION
SETTING
NO CONVERSION

FIG.5

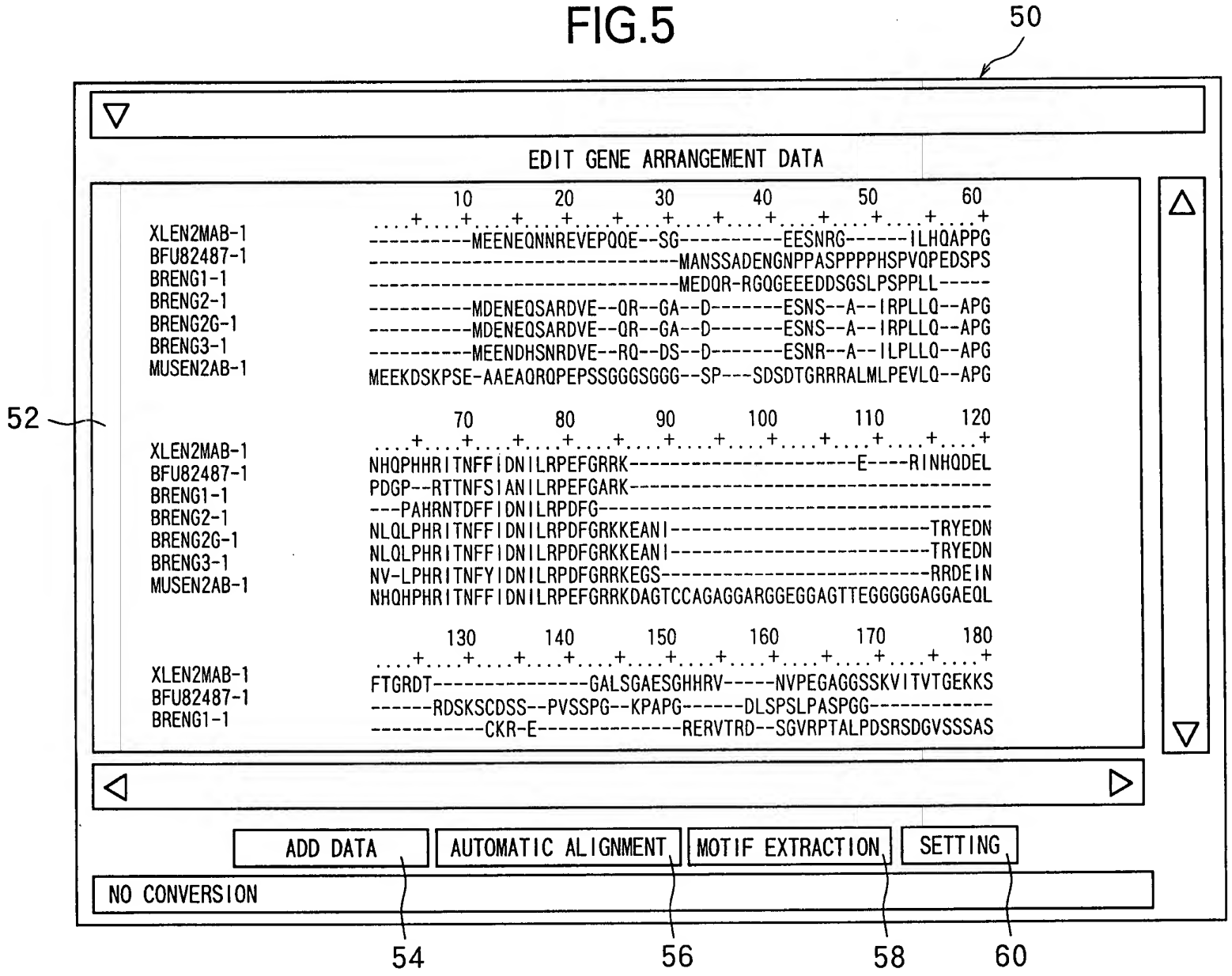

50
EDIT GENE ARRANGEMENT DATA
52
10 20 30 40 50 60
XLEN2MAB-1 ----------MEENEQNNREVEPQQE--SG----------EESNRG------ILHQAPPG
BFU82487-1 ----------MANSSADENGNPPASPPPPHSPVQPEDSPS
BRENG1-1 ----------MEDQR-RGQGEEEDDSGSLPSPPLL-----
BRENG2-1 ----------MDENEQSARDVE--QR--GA--D-------ESNS--A--IRPLLQ--APG
BRENG2G-1 ----------MDENEQSARDVE--QR--GA--D-------ESNS--A--IRPLLQ--APG
BRENG3-1 ----------MEENDHSNRDVE--RQ--DS--D-------ESNR--A--ILPLLQ--APG
MUSEN2AB-1 MEEKDSKPSE-AAEAQRQPEPSSGGGSGGG--SP---SDSDTGRRRALMLPEVLQ--APG
70 80 90 100 110 120
XLEN2MAB-1 NHQPHHRITNFFIDNILRPEFGRRK----------E----RINHQDEL
BFU82487-1 PDGP--RTTNFSIANILRPEFGARK----------
BRENG1-1 ---PAHRNTDFFIDNILRPDFG----------
BRENG2-1 NLQLPHRITNFFIDNILRPDFGRKKEANI----------TRYEDN
BRENG2G-1 NLQLPHRITNFFIDNILRPDFGRKKEANI----------TRYEDN
BRENG3-1 NV-LPHRITNFYIDNILRPDFGRRKEGS----------RRDEIN
MUSEN2AB-1 NHQHPHRITNFFIDNILRPEFGRRKDAGTCCAGAGGARGGEGGAGTTEGGGGGAGGAEQL
130 140 150 160 170 180
XLEN2MAB-1 FTGRDT----------GALSGAESGHHRV-----NVPEGAGGSSKVITVTGEKKS
BFU82487-1 ------RDSKSCDSS--PVSSPG--KPAPG------DLSPSLPASPGG----------
BRENG1-1 ----------CKR-E----------RERVTRD--SGVRPTALPDSRSDGVSSSAS
ADD DATA
AUTOMATIC ALIGNMENT
MOTIF EXTRACTION
SETTING
NO CONVERSION
54
56
58
60

FIG.6

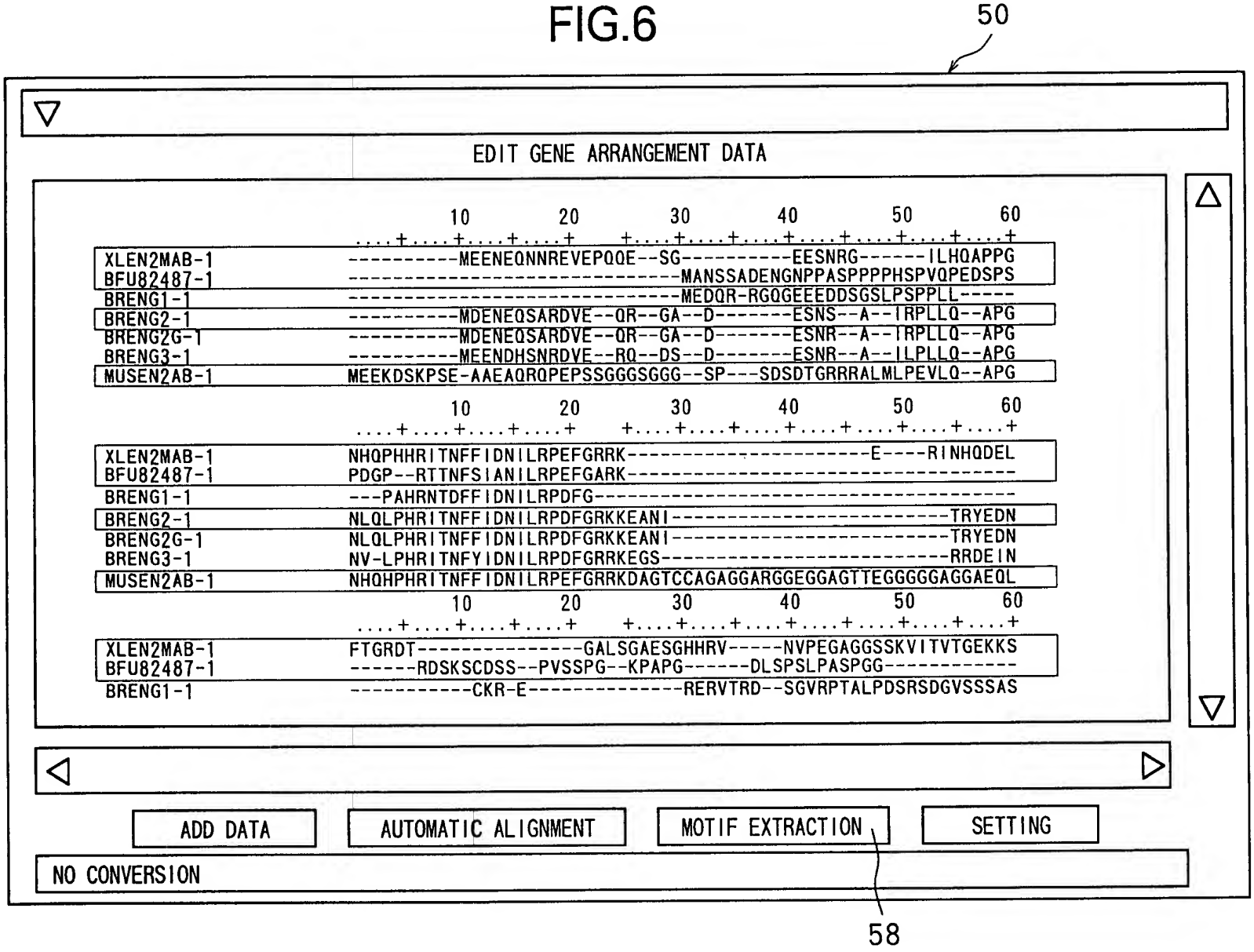

50
EDIT GENE ARRANGEMENT DATA
10 20 30 40 50 60
XLEN2MAB-1 ----------MEENEQNNREVEPQQE--SG----------EESNRG------ILHQAPPG
BFU82487-1 ------------------------------MANSSADENGNPPASPPPPHSPVQPEDSPS
BRENG1-1 ------------------------------MEDQR-RGQGEEEDDSGSLPSPPLL-----
BRENG2-1 ----------MDENEQSARDVE--QR--GA--D-------ESNS--A--IRPLLQ--APG
BRENG2G-1 ----------MDENEQSARDVE--QR--GA--D-------ESNR--A--IRPLLQ--APG
BRENG3-1 ----------MEENDHSNRDVE--RQ--DS--D-------ESNR--A--ILPLLQ--APG
MUSEN2AB-1 MEEKDSKPSE-AAEAQRQPEPSSGGGSGGG--SP---SDSDTGRRRALMLPEVLQ--APG
10 20 30 40 50 60
XLEN2MAB-1 NHQPHHRITNFFIDNILRPEFGRRK----------E----RINHQDEL
BFU82487-1 PDGP--RTTNFSIANILRPEFGARK----------
BRENG1-1 ---PAHRNTDFFIDNILRPDFG----------
BRENG2-1 NLQLPHRITNFFIDNILRPDFGRKKEANI----------TRYEDN
BRENG2G-1 NLQLPHRITNFFIDNILRPDFGRKKEANI----------TRYEDN
BRENG3-1 NV-LPHRITNFYIDNILRPDFGRRKEGS----------RRDEIN
MUSEN2AB-1 NHQHPHRITNFFIDNILRPEFGRRKDAGTCCAGAGGARGGEGGAGTTEGGGGGAGGAEQL
10 20 30 40 50 60
XLEN2MAB-1 FTGRDT----------GALSGAESGHHRV-----NVPEGAGGSSKVITVTGEKKS
BFU82487-1 ------RDSKSCDSS--PVSSPG--KPAPG------DLSPSLPASPGG----------
BRENG1-1 ----------CKR-E----------RERVTRD--SGVRPTALPDSRSDGVSSSAS
ADD DATA
AUTOMATIC ALIGNMENT
MOTIF EXTRACTION
SETTING
NO CONVERSION
58

FIG.7

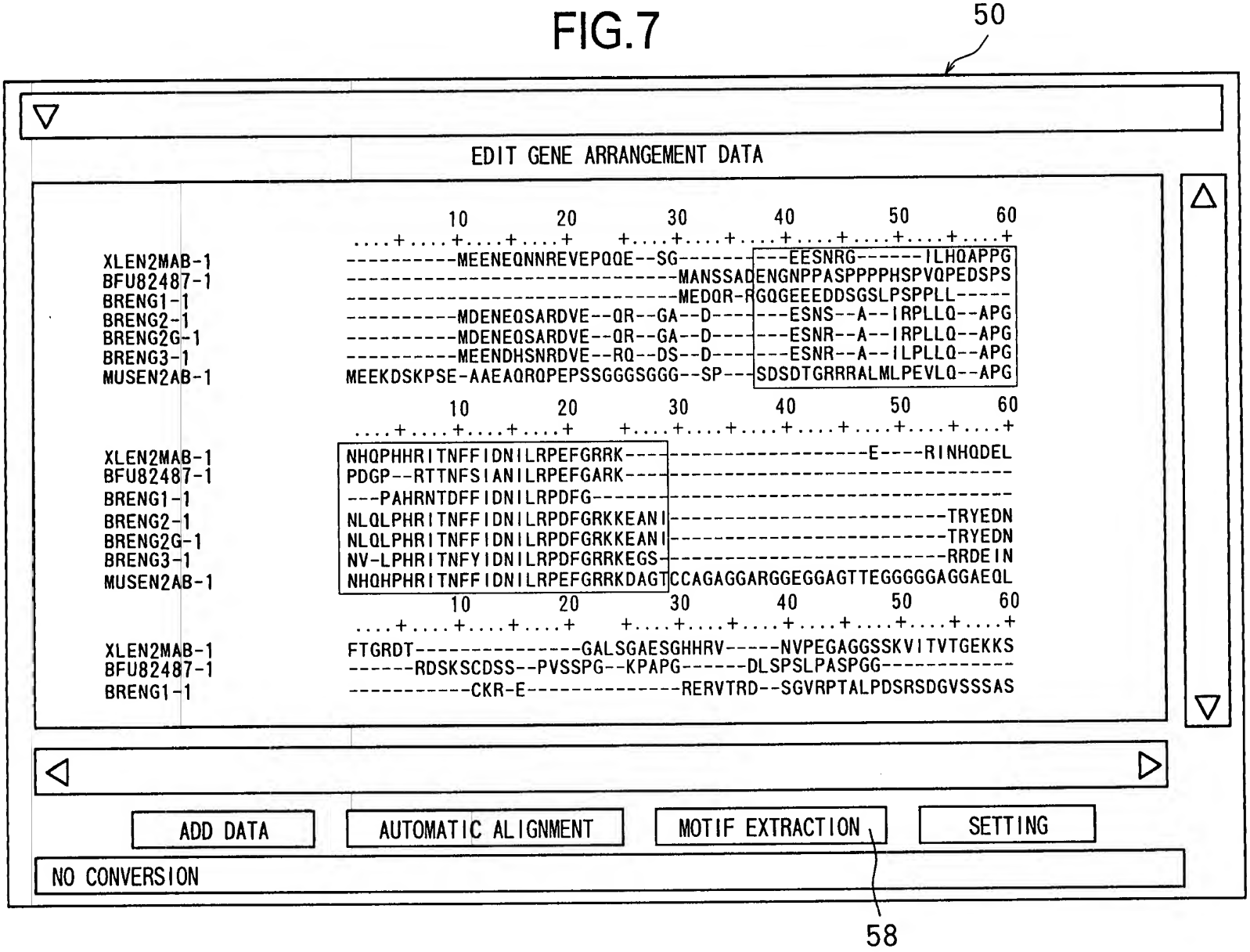

50
EDIT GENE ARRANGEMENT DATA
10 20 30 40 50 60
XLEN2MAB-1
BFU82487-1
BRENG1-1
BRENG2-1
BRENG2G-1
BRENG3-1
MUSEN2AB-1
ADD DATA
AUTOMATIC ALIGNMENT
MOTIF EXTRACTION
SETTING
NO CONVERSION
58

FIG.8

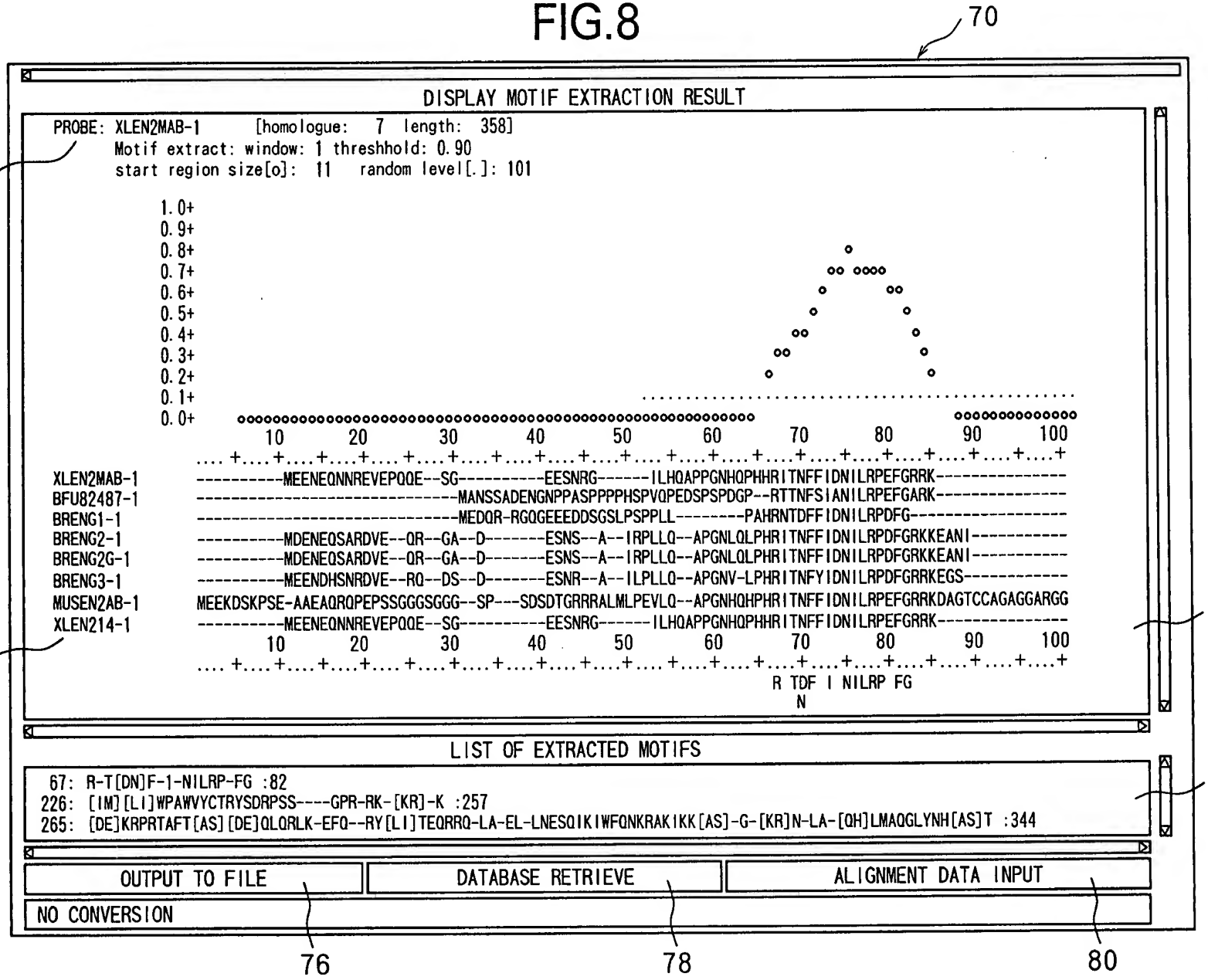

70
DISPLAY MOTIF EXTRACTION RESULT
PROBE: XLEN2MAB-1 [homologue: 7 length: 358]
Motif extract: window: 1 threshhold: 0.90
start region size[o]: 11 random level[.]: 101
72a
1.0+
0.9+
0.8+
0.7+
0.6+
0.5+
0.4+
0.3+
0.2+
0.1+
0.0+
10 20 30 40 50 60 70 80 90 100
XLEN2MAB-1 ----------MEENEQNNREVEPQQE--SG----------EESNRG------ILHQAPPGNHQPHHRITNFFIDNILRPEFGRRK----------
BFU82487-1 ----------MANSSADENGNPPASPPPPHSPVQPEDSPSPDGP--RTTNFSIANILRPEFGARK----------
BRENG1-1 ----------MEDQR-RGQGEEEDDSGSLPSPPLL--------PAHRNTDFFIDNILRPDFG----------
BRENG2-1 ----------MDENEQSARDVE--QR--GA--D-------ESNS--A--IRPLLQ--APGNLQLPHRITNFFIDNILRPDFGRKKEANI----------
BRENG2G-1 ----------MDENEQSARDVE--QR--GA--D-------ESNS--A--IRPLLQ--APGNLQLPHRITNFFIDNILRPDFGRKKEANI----------
BRENG3-1 ----------MEENDHSNRDVE--RQ--DS--D-------ESNR--A--ILPLLQ--APGNV-LPHRITNFYIDNILRPDFGRRKEGS----------
MUSEN2AB-1 MEEKDSKPSE-AAEAQRQPEPSSGGGSGGG--SP---SDSDTGRRRALMLPEVLQ--APGNHQHPHRITNFFIDNILRPEFGRRKDAGTCCAGAGGARGG
XLEN214-1 ----------MEENEQNNREVEPQQE--SG----------EESNRG------ILHQAPPGNHQPHHRITNFFIDNILRPEFGRRK----------
72b
10 20 30 40 50 60 70 80 90 100
R TDF I NILRP FG
N
72
LIST OF EXTRACTED MOTIFS
67: R-T[DN]F-1-NILRP-FG :82
226: [IM][LI]WPAWVYCTRYSDRPSS----GPR-RK-[KR]-K :257
265: [DE]KRPRTAFT[AS][DE]QLQRLK-EFQ--RY[LI]TEQRRQ-LA-EL-LNESQIKIWFQNKRAKIKK[AS]-G-[KR]N-LA-[QH]LMAQGLYNH[AS]T :344
74
OUTPUT TO FILE
DATABASE RETRIEVE
ALIGNMENT DATA INPUT
NO CONVERSION
76
78
80

FIG.9

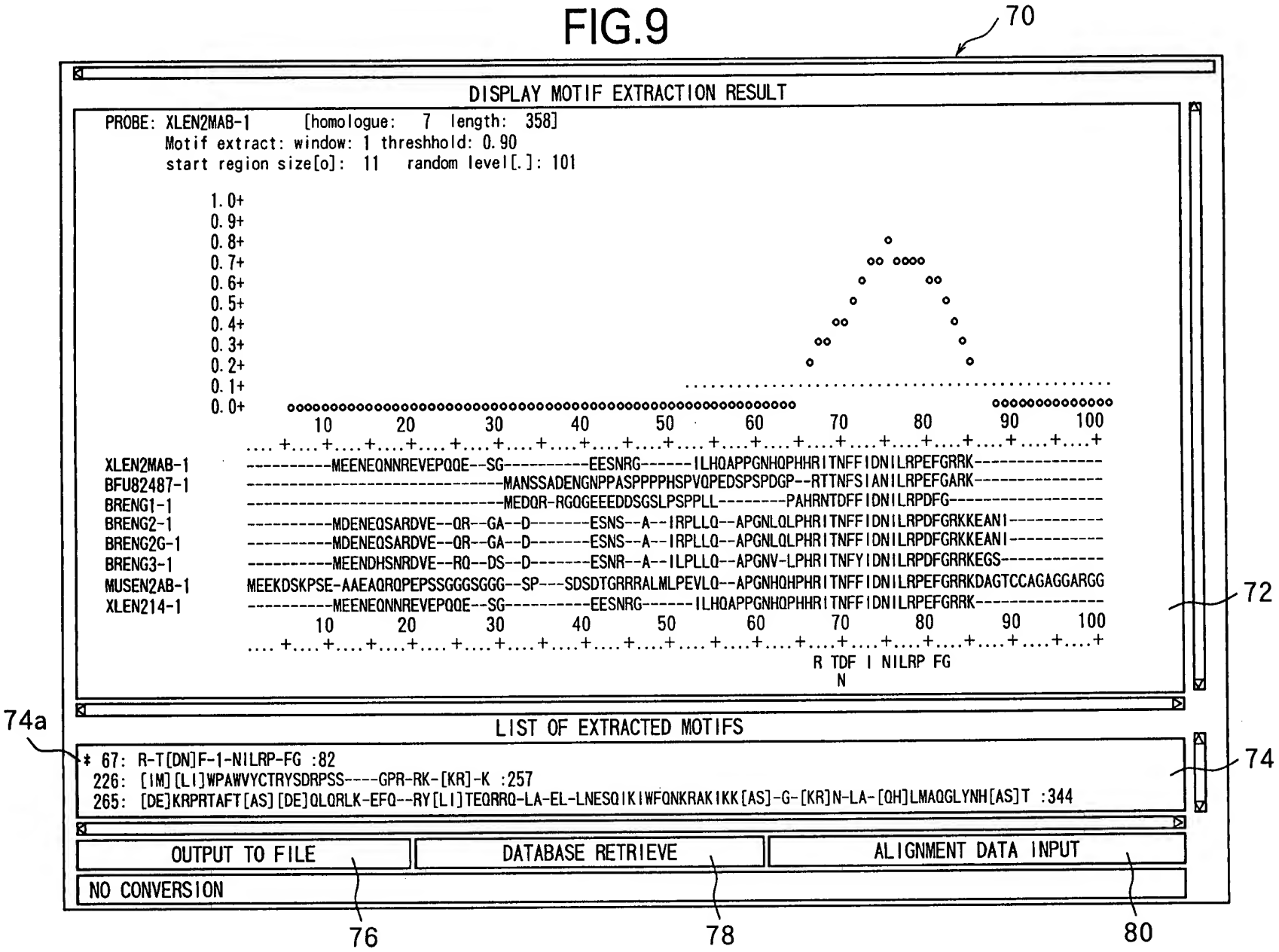

70
DISPLAY MOTIF EXTRACTION RESULT
PROBE: XLEN2MAB-1 [homologue: 7 length: 358]
Motif extract: window: 1 threshhold: 0.90
start region size[o]: 11 random level[.]: 101
1.0+
0.9+
0.8+
0.7+
0.6+
0.5+
0.4+
0.3+
0.2+
0.1+
0.0+
10 20 30 40 50 60 70 80 90 100
XLEN2MAB-1 ----------MEENEQNNREVEPQQE--SG----------EESNRG------ILHQAPPGNHQPHHRITNFFIDNILRPEFGRRK----------
BFU82487-1 ----------MANSSADENGNPPASPPPPHSPVQPEDSPSPDGP--RTTNFSIANILRPEFGARK----------
BRENG1-1 ----------MEDQR-RGQGEEEDDSGSLPSPPLL--------PAHRNTDFFIDNILRPDFG----------
BRENG2-1 ----------MDENEQSARDVE--QR--GA--D-------ESNS--A--IRPLLQ--APGNLQLPHRITNFFIDNILRPDFGRKKEANI----------
BRENG2G-1 ----------MDENEQSARDVE--QR--GA--D-------ESNS--A--IRPLLQ--APGNLQLPHRITNFFIDNILRPDFGRKKEANI----------
BRENG3-1 ----------MEENDHSNRDVE--RQ--DS--D-------ESNR--A--ILPLLQ--APGNV-LPHRITNFYIDNILRPDFGRRKEGS----------
MUSEN2AB-1 MEEKDSKPSE-AAEAQRQPEPSSGGGSGGG--SP---SDSDTGRRRALMLPEVLQ--APGNHQHPHRITNFFIDNILRPEFGRRKDAGTCCAGAGGARGG
XLEN214-1 ----------MEENEQNNREVEPQQE--SG----------EESNRG------ILHQAPPGNHQPHHRITNFFIDNILRPEFGRRK----------
10 20 30 40 50 60 70 80 90 100
R TDF I NILRP FG
N
72
74a
LIST OF EXTRACTED MOTIFS
* 67: R-T[DN]F-1-NILRP-FG :82
226: [IM][LI]WPAWVYCTRYSDRPSS----GPR-RK-[KR]-K :257
265: [DE]KRPRTAFT[AS][DE]QLQRLK-EFQ--RY[LI]TEQRRQ-LA-EL-LNESQIKIWFQNKRAKIKK[AS]-G-[KR]N-LA-[QH]LMAQGLYNH[AS]T :344
74
OUTPUT TO FILE
DATABASE RETRIEVE
ALIGNMENT DATA INPUT
NO CONVERSION
76
78
80

FIG.10

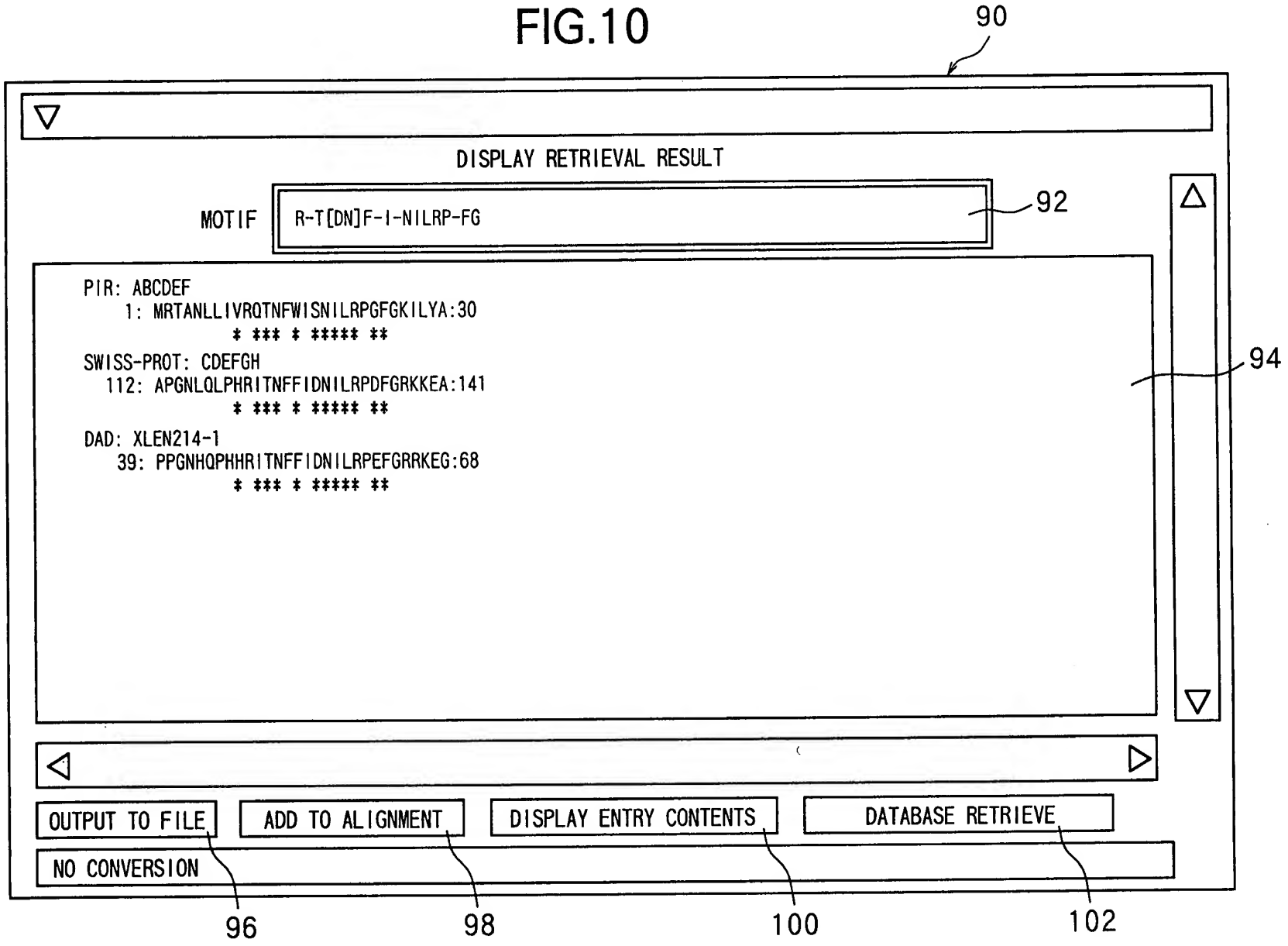

90
DISPLAY RETRIEVAL RESULT
MOTIF
R-T[DN]F-I-NILRP-FG
92
PIR: ABCDEF
1: MRTANLLIVRQTNFWISNILRPGFGKILYA:30
* *** * ***** **
SWISS-PROT: CDEFGH
112: APGNLQLPHRITNFFIDNILRPDFGRKKEA:141
* *** * ***** **
DAD: XLEN214-1
39: PPGNHQPHHRITNFFIDNILRPEFGRRKEG:68
* *** * ***** **
94
OUTPUT TO FILE
ADD TO ALIGNMENT
DISPLAY ENTRY CONTENTS
DATABASE RETRIEVE
NO CONVERSION
96
98
100
102

FIG.11

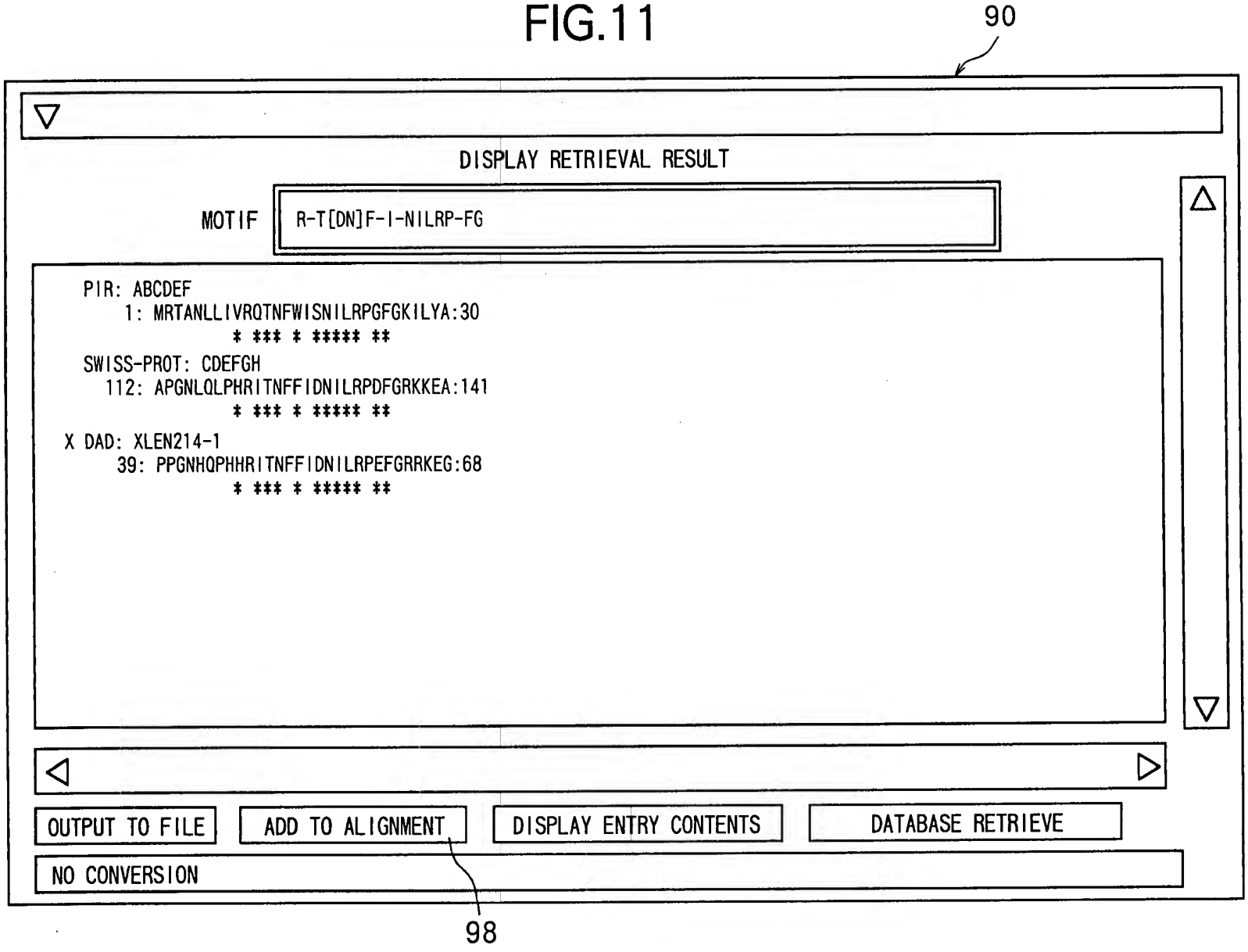
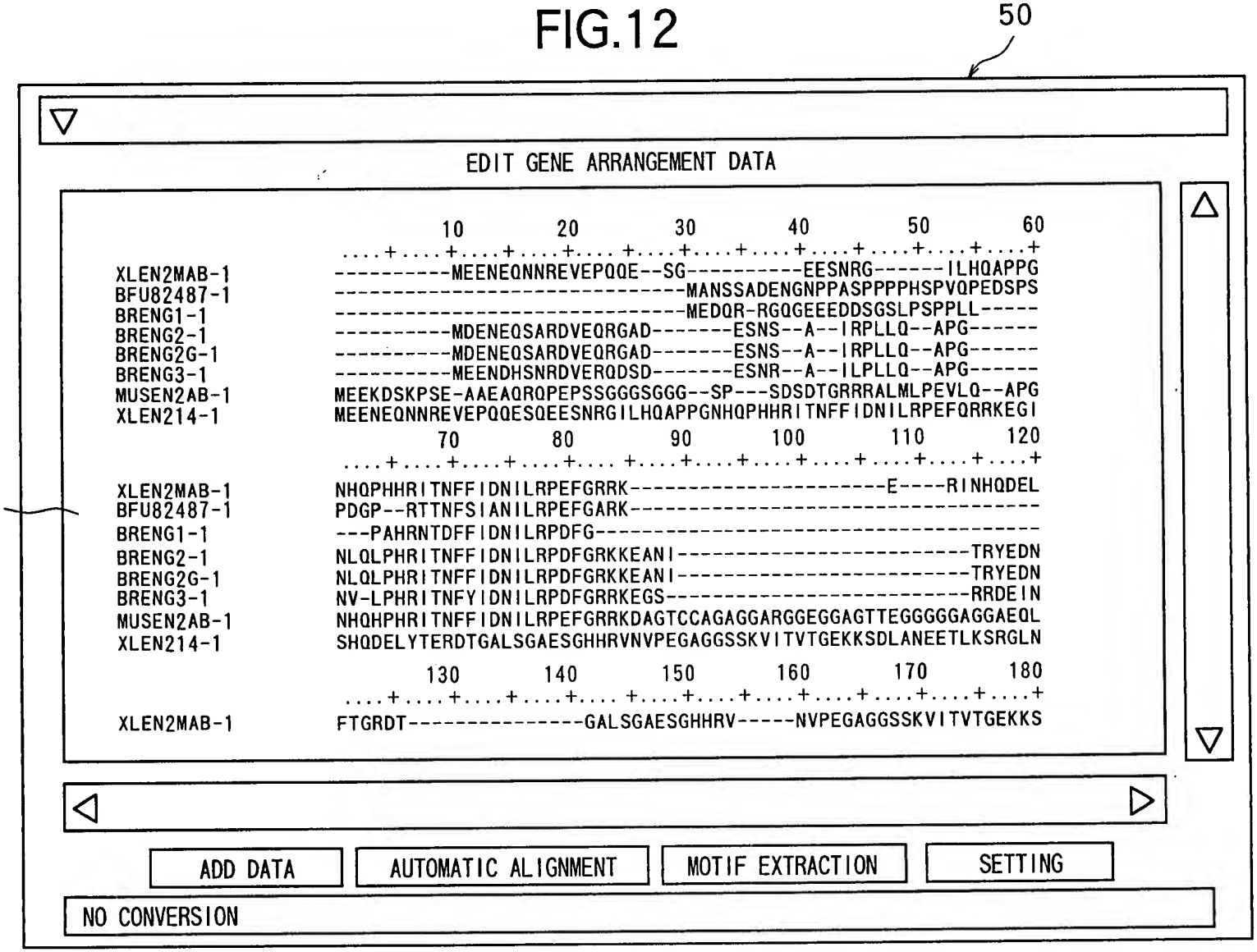

90
DISPLAY RETRIEVAL RESULT
MOTIF
R-T[DN]F-I-NILRP-FG
PIR: ABCDEF
1: MRTANLLIVRQTNFWISNILRPGFGKILYA:30
* *** * ***** **
SWISS-PROT: CDEFGH
112: APGNLQLPHRITNFFIDNILRPDFGRKKEA:141
* *** * ***** **
X DAD: XLEN214-1
39: PPGNHQPHHRITNFFIDNILRPEFGRRKEG:68
* *** * ***** **
OUTPUT TO FILE
ADD TO ALIGNMENT
DISPLAY ENTRY CONTENTS
DATABASE RETRIEVE
NO CONVERSION
98

FIG.12


50
EDIT GENE ARRANGEMENT DATA
52
10 20 30 40 50 60
XLEN2MAB-1 ----------MEENEQNNREVEPQQE--SG----------EESNRG------ILHQAPPG
BFU82487-1 ----------MANSSADENGNPPASPPPPHSPVQPEDSPS
BRENG1-1 ----------MEDQR-RGQGEEEDDSGSLPSPPLL-----
BRENG2-1 ----------MDENEQSARDVEQRGAD-------ESNS--A--IRPLLQ--APG------
BRENG2G-1 ----------MDENEQSARDVEQRGAD-------ESNS--A--IRPLLQ--APG------
BRENG3-1 ----------MEENDHSNRDVERQDSD-------ESNR--A--ILPLLQ--APG------
MUSEN2AB-1 MEEKDSKPSE-AAEAQRQPEPSSGGGSGGG--SP---SDSDTGRRRALMLPEVLQ--APG
XLEN214-1 MEENEQNNREVEPQQESQEESNRGILHQAPPGNHQPHHRITNFFIDNILRPEFQRRKEGI
70 80 90 100 110 120
XLEN2MAB-1 NHQPHHRITNFFIDNILRPEFGRRK----------E----RINHQDEL
BFU82487-1 PDGP--RTTNFSIANILRPEFGARK----------
BRENG1-1 ---PAHRNTDFFIDNILRPDFG----------
BRENG2-1 NLQLPHRITNFFIDNILRPDFGRKKEANI----------TRYEDN
BRENG2G-1 NLQLPHRITNFFIDNILRPDFGRKKEANI----------TRYEDN
BRENG3-1 NV-LPHRITNFYIDNILRPDFGRRKEGS----------RRDEIN
MUSEN2AB-1 NHQHPHRITNFFIDNILRPEFGRRKDAGTCCAGAGGARGGEGGAGTTEGGGGGAGGAEQL
XLEN214-1 SHQDELYTERDTGALSGAESGHHRVNVPEGAGGSSKVITVTGEKKSDLANEETLKSRGLN
130 140 150 160 170 180
XLEN2MAB-1 FTGRDT----------GALSGAESGHHRV-----NVPEGAGGSSKVITVTGEKKS
ADD DATA
AUTOMATIC ALIGNMENT
MOTIF EXTRACTION
SETTING
NO CONVERSION